CARTRIDGE BALLAST WEIGHTS
SELECTION AND FITTING INSTRUCTIONS

The system resonance frequency is critical. If it is too low, low frequency information of the kind inherent in all disc records caused by moulding imperfections, surface ripple, warp and run-out will produce signals which although below direct audibility will cause undesirable side effects in the listening range. These will include random low frequency sounds, inter-modulation distortion, image instability and even wow due to excessive fore and aft or scrubbing motion of the stylus.

A high system resonance frequency minimises these undesirable effects by raising the point at which the output from the cartridge ceases. However, if the system resonance frequency is too high, as it could be if a low compliance cartridge were used with a low mass arm, harmonics of the resonance frequency may become audible reducing bass definition.

It will be seen that if a range of cartridges of widely differing weight and compliance is to be accommodated, the effective mass of the arm must also be variable over a wide range so that the system resonance will occur in the most favourable band of frequencies. Present day thinking is that this is 8 - 13 Hz, represented by the shaded portion in Fig. 1.

If the resonance is above 13 Hz the system mass should be increased by adding weight to the shell and the SME cartridge ballast weights are a convenient way of doing this. Two types are available, Part No. 3818 - 4.4 grams 0.048" (1.2mm) thick and Part No. 3817 - 2.2 grams 0.024" (0.6mm) thick. These can be added as required, taking care by reference to Fig. 2. that the total weight added together with that of the cartridge does not exceed the maximum that the arm is capable of balancing.

With Series III arms it is unlikely that an over-low resonance frequency will be encountered because its effective mass is only 5 grams. It is therefore suitable for cartridges of the highest compliance.

SME precision pick-up arms can be fluid damped with an accessory damper. (Standard equipment on the Series III arm.) When this is used the resonance frequency will be at approximately 1.5 Hz above the figure obtained from the diagram. Such are the overall benefits of damping, however, it is not worth dispensing with it merely to lower the resonance frequency, which should be dealt with by adding mass as already described.

The effective mass of SME precision pick-up arms is given in Fig. 2. Add to this the overall weight (not the tracking force) of the cartridge to obtain the total effective mass. Note this figure on the base line of Fig. 1. Refer to the cartridge manufacturer's specification for its compliance. If separate vertical and horizontal figures are quoted they should be added together and the sum divided by two. Note this figure on the left-hand side of Fig. 1. The point of intersection of the lines on the grid will indicate the system resonance in Hz.

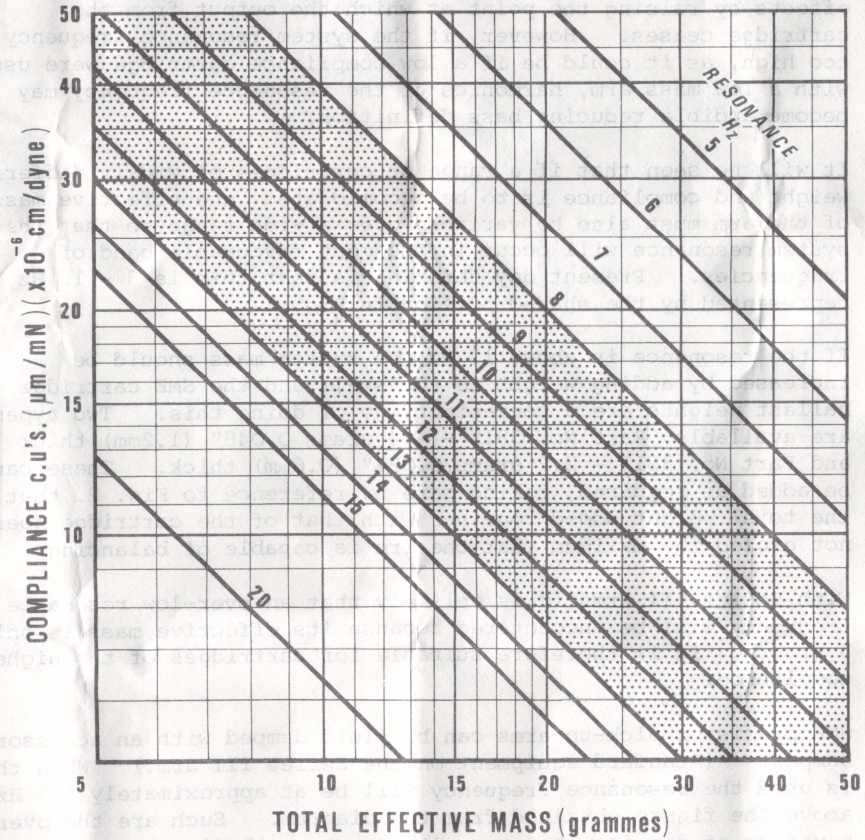


Fig. 1

Pick-up Arm	Balance Weight ≠	Range of Cart. Weights Balanced (grams)*	Average Effective Mass (grams)
3009 Ser II	Std.	2 - 20	12.5
3012 Ser II	Std.	4 - 18	14.0
3009 Ser II Imp	Std. (1901)	3 - 7	6.5
"	1901/LWR	0 - 3	
"	1902	6 - 11	
"	1902/MWR	9 - 15	
"	1902/HWR	16 - 24	
3009/S2 Imp	Std. (1902)	3 - 8	9.5
"	1901	0 - 4	
"	1902/MWR	6 - 13	
"	1902/HWR	13 - 21	
Series III	Std.	0 - 13	5.0
"	Std. + 3821	5.5 - 20.8	
Series IIIS	Std.	0 - 12.5	5.0
"	3200 + 3821	5.5 - 20.8	
3009-R	Std.	1 - 27	12.7
3010-R	Std.	0 - 25	12.8
3012-R	Std.	0 - 25	14.0

Notes:

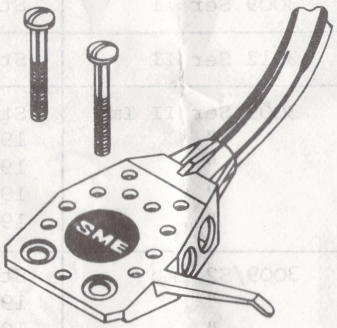
≠ Alternative balance weights are available for certain arms. Please see current price list.

* Cartridge weight which can be balanced is actual weight of cartridge plus any ballast weights used.

Fig. 2

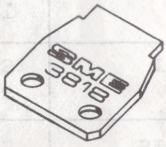
FITTING INSTRUCTIONS

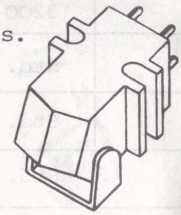
1. Before fitting check that your cartridge fixing screws are of sufficient length to allow for the additional thickness of the cartridge ballast weight(s). Replacement sets of alloy cartridge fixing screws are available from SME Limited, Part No. 2300, and comprise four pairs of screws having shank lengths of 1/4" (6.4mm), 7/16" (11.1mm), 5/8" (15.9mm) and 3/4" (19.1mm), one pair of nuts and one pair of spacers.



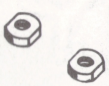
2. Remove the stylus assembly or fit the stylus guard to the cartridge.

3. In cases where a cartridge is already fitted care should be taken not to strain the connecting wires whilst inserting a ballast weight between the cartridge and the shell. If necessary they can be disconnected. Use a small pair of fine-nosed pliers. If you don't have a pair buy them - they will be a good investment for work on your system generally.





4. The ballast weight(s) should be inserted between the cartridge and the headshell. When this has been done cartridge fixing screws of the appropriate length can be fitted. They should be tightened securely but not to a degree that might damage the screws.



5. If the cartridge was disconnected, re-fit the pin jacks to the appropriate terminals.